

Claims

What is claimed is:

1. A method for person identification by biometric analysis of facial images,
5 comprising the steps of:

starting a face recognition apparatus ;

providing an active lights to illuminate a target face when an user
approaches said face recognition apparatus;

10 providing an image acquisition unit to capture a plurality of images from a
target face illuminated by an active lights;

sending at least one facial image acquired by said image capturing unit to a
data processing unit, and detecting and/or localizing a positions of eyes and/or
said face by said data processing unit;

15 cropping a portion of said facial image and extracting facial feature from
said portion of said facial image by said data processing unit;

comparing facial feature with that of previously extracted and stored in a
face database;

outputting a recognition result obtained from said comparing step.

20 2. The method of claim 1, wherein said active lights are near infrared
lighting sources, or visible light sources, or flash lights, or any combination of
them.

3. The method of claim 1 or 2, wherein a total energy of an active lighting
and environmental lighting on said face area is greater than that of environmental
lighting.

25 4. The method of claim 3, wherein a total energy of active lights and
environmental lightings on said facial area is greater or equal to twice an energy
of said environmental lightings.

5. The method of claim 2, wherein, after sending at least one facial image to
a data processing unit, said method further includes a step of judging whether

localizing eyes and/or face is successful; if yes, execute next step, otherwise do localizing step again;

6. The method of claim 1, 2, 4 or 5, wherein a step of sending at least one face image, there includes a step of detecting specular highlights in the eyes in
5 said face image and thereby detecting eye positions.

7. The method of claim 6, wherein said method further includes a step that said image capturing unit can track said face area illuminated by an active lights.

8. A method for facial image acquisition, comprising the steps of :

Providing a plurality of active lighting to illuminate a face area,

10 Providing an image capturing unit for capturing a facial image of a target face, and sending said facial image to a data processing unit used for localizing and recognizing said target face;

Wherein a total energy of said active lighting and said environmental lighting on said face area is greater than that of environmental lighting.

15 9. The method of claim 8, wherein a total energy of said active lighting and said environmental lighting on said face area is greater or equal to twice an energy of said environmental lighting.

10.The method of claim 8 or 9, wherein a relative position between said active lighting and said image apparatus is relatively fixed, and a direction of said
20 active lights and an axis of a camera lens of said image apparatus are in a sharp angle.

11. A method according to in claim 8, wherein said active lighting are near infrared light sources, or visible light sources, or flash lights, or any combination of them.

25 12. The method of claim 11, wherein said data processing unit can make use of the specularity in each of the eyes to localize the eye position, after a facial image is captured.

13. A facial image acquisition apparatus used for realizing the method of claim1, comprising an active light, an image capturing unit, a power switch and a

data processing unit;

Said active lights used for illuminating a face area;

Said power switch use for controlling said active lights to illuminate said face area;

5 Said image capturing unit used for capturing facial images of said face area, and sending at least one facial image to said data processing unit;

 Said data processing unit used for receiving images from said image capturing unit, and localizing eyes and face in said facial image, cropping a portion of said facial image, and extracting facial features, and comparing facial
10 features with that of previously extracted and stored in a facial image database.

 14. The apparatus of claim 13, wherein a total energy of said active lights and said environmental lighting on said face area is greater than an energy of said environmental lighting.

 15. The apparatus of claim 14, wherein a position of said active lighting and
15 said image capturing unit is relatively fixed, and a angle between a direction of said active lighting and a axis of the camera lens of said image apparatus between 0° to 90°.

 16. The apparatus of claim 15, wherein the direction of said active lights is approximately parallel to an axis of a camera lens.

20 17. The apparatus of claim 15 or 16, wherein said active lights are near infrared light sources, or visible light sources, or flash lights, or any combination of them.

 18. The apparatus of claim 17, wherein wavelength of said active lights are in a range of 740nm-4000nm, or a plurality of several wavelengths in said range.

25 19. The apparatus of claim 14, 15, 16 or 18, wherein an infrared filter is disposed on an infrared camera lens for cutting off visible lights radiation while allowing near infrared light radiation to pass through.

 20. The apparatus of claim 19, wherein said infrared optical filter is of ban-pass or long-pass type, to suppress active lights while allowing infrared

active lights to pass.

21. The apparatus of claim 14, 15, 16, 18 or 20, wherein there is a display device for displaying facial image, used for adjusting the position of a target face in vertical and horizontal directions.

5 22. The apparatus of claim 21, wherein said displaying device is a mirror or an LCD (liquid crystal displace).

23. The apparatus of claim 13 or 22, wherein said image capturing unit is a video camera or a digital camera.

24. The apparatus of claim 13, wherein said data processing unit comprises a
10 PC / computer or an embedded processor in which image processing software is installed.

25. The apparatus of claim 13, wherein said power switch is a proximity sensor switch or an RFID controlled switch.

26. The apparatus of claim 13, 14, 16, 17, 18, 19, 20, 22, 24 or 25, wherein
15 said active lights are mounted around a lens of said image capturing unit.